

## EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	("3489795").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L2	2	("5054611").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L3	2	("6054611").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L4	2	("5608105").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L5	3	("3085071").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L6	58077	formate	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L7	904	levulinate	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L8	304	L6 and L7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L9	215	L6 same L7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L10	771683	fuel	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L11	753021	\$fuel	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41

## EAST Search History

L12	772434	L10 or L11	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L13	6	L9 and L12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L14	40	L7 and L12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L15	3	"5,189,215"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L16	53	levulinic adj ester	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L17	3	"9421753"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L18	264478	alkene or olefin	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L19	153	L8 and L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L20	2256	levulinic	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L21	4	L20 near5 L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L22	4	"5290325"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L23	2	"5892107".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41

## EAST Search History

L24	3257	levulin\$	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L25	197	560/247.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L26	613	560/174.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L27	8	L26 and L25	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L28	0	L27 and L24	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L29	98934	gasoline	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L30	815461	L12 or L29	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L31	7	("2118506").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/06/21 11:41
L32	5	L20 near10 L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L33	7	L20 near15 L18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41
L34	9	L8 and L30	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2006/06/21 11:41

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NEWS 4 FEB 21 STN AnaVist, Version 1.1, lets you share your STN AnaVist visualization results  
NEWS 5 FEB 22 The IPC thesaurus added to additional patent databases on STN  
NEWS 6 FEB 22 Updates in EPFULL; IPC 8 enhancements added  
NEWS 7 FEB 27 New STN AnaVist pricing effective March 1, 2006  
NEWS 8 MAR 03 Updates in PATDPA; addition of IPC 8 data without attributes  
NEWS 9 MAR 22 EMBASE is now updated on a daily basis  
NEWS 10 APR 03 New IPC 8 fields and IPC thesaurus added to PATDPAFULL  
NEWS 11 APR 03 Bibliographic data updates resume; new IPC 8 fields and IPC thesaurus added in PCTFULL  
NEWS 12 APR 04 STN AnaVist \$500 visualization usage credit offered  
NEWS 13 APR 12 LINSPEC, learning database for INSPEC, reloaded and enhanced  
NEWS 14 APR 12 Improved structure highlighting in FQHIT and QHIT display in MARPAT  
NEWS 15 APR 12 Derwent World Patents Index to be reloaded and enhanced during second quarter; strategies may be affected  
NEWS 16 MAY 10 CA/CAplus enhanced with 1900-1906 U.S. patent records  
NEWS 17 MAY 11 KOREAPAT updates resume  
NEWS 18 MAY 19 Derwent World Patents Index to be reloaded and enhanced  
NEWS 19 MAY 30 IPC 8 Rolled-up Core codes added to CA/CAplus and USPATFULL/USPAT2  
NEWS 20 MAY 30 The F-Term thesaurus is now available in CA/CAplus  
NEWS 21 JUN 02 The first reclassification of IPC codes now complete in INPADOC

NEWS EXPRESS JUNE 16 CURRENT WINDOWS VERSION IS V8.01b, CURRENT MACINTOSH VERSION IS V6.0c(ENG) AND V6.0Jc(JP), AND CURRENT DISCOVER FILE IS DATED 23 MAY 2006.

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=> file caplus  
COST IN U.S. DOLLARS  
FULL ESTIMATED COST
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	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	0.21	0.21

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FILE LAST UPDATED: 20 Jun 2006 (20060620/ED)

Effective October 17, 2005, revised CAS Information Use Policies apply. They are available for your review at:

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```
=> levulinate  
    1201 LEVULINATE  
    80 LEVULINATES  
L1      1239 LEVULINATE  
          (LEVULINATE OR LEVULINATES)
```

```
=> formate  
    40402 FORMATE  
    3436 FORMATES  
L2      41682 FORMATE  
          (FORMATE OR FORMATES)
```

```
=> l1 and l2  
L3      47 L1 AND L2
```

```
=> gasoline  
    69748 GASOLINE  
    5471 GASOLINES  
L4      70183 GASOLINE  
          (GASOLINE OR GASOLINES)
```

```
=> fuls  
    3 FULS  
    1 FULSES  
L5      4 FULS  
          (FULS OR FULSES)
```

```
=> fuel  
    378524 FUEL  
    162750 FUELS  
L6      429770 FUEL  
          (FUEL OR FUELS)
```

```
=> ?fuel  
L7      379639 ?FUEL
```

=> 16 or 17  
L8 430585 L6 OR L7

=> 14 or 18  
L9 477388 L4 OR L8

=> 13 and 19  
L10 4 L3 AND L9

=> d 110 1-4 ti fbib abs

L10 ANSWER 1 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid esters and formate esters as gasoline  
and diesel fuel additives prepared from  $\alpha$ -angelica lactone  
AN 2005:698416 CAPLUS  
DN 143:196535  
TI Levulinic acid esters and formate esters as gasoline  
and diesel fuel additives prepared from  $\alpha$ -angelica lactone  
IN Manzer, Leo Ernest  
PA USA  
SO U.S. Pat. Appl. Publ., 16 pp.  
CODEN: USXXCO  
DT Patent  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005171374	A1	20050804	US 2004-768276	20040130
	WO 2005075405	A1	20050818	WO 2005-US2744	20050128
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				

US 2004-768276 A 20040130

OS MARPAT 143:196535  
AB Fuels and fuel additives are levulinic acid esters  
prepared by reaction of  $\alpha$ -angelica lactone (i.e., 5-methyl-2(3H)-  
furanone) with olefins of general formula R1R2C=CR3R4, in the presence of  
an aqueous acid catalyst, to form esters with general structures  
 $\text{CH}_3\text{-C}(:\text{O})\text{-}(\text{CH}_2)_2\text{-C}(:\text{O})\text{-O-CR}_1\text{R}_2\text{-CHR}_3\text{R}_4$  or  $\text{CH}_3\text{-C}(:\text{O})\text{-}(\text{CH}_2)_2\text{-C}(:\text{O})\text{-O-CR}_3\text{R}_4\text{.2-}$   
 $\text{CHR}_1\text{R}_2$  (R1,R2,R3,R4 are H, C1-10-substituted or -unsubstituted alkyl,  
C3-20-cycloalkyl (in which  $\geq 2$  can form a cyclic or bicyclic alkyl),  
such that the total number of carbon atoms is  $\leq 22$ ). In addition, formic  
acid may be added to the  $\alpha$ -angelica lactone-containing reaction mixture to  
form formate esters of general structures  $\text{HC}(:\text{O})\text{-O-CR}_1\text{R}_2\text{-CHR}_3\text{R}_4$   
and  $\text{HC}(:\text{O})\text{-O-CR}_3\text{R}_4\text{-CHR}_1\text{R}_2$ , in which R1, R2, R3, and R4 are as described  
above.  $\alpha$ -Angelica lactone is typically prepared by aqueous acid  
hydrolysis of biomass at 0.69-13.8 MPa and 200-250°.

L10 ANSWER 2 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic and formic acid esters, as gasoline and diesel  
fuel oxygenate additives, prepared from biomass by hydrolysis and  
esterification with olefins  
AN 2003:818512 CAPLUS  
DN 139:294305  
TI Levulinic and formic acid esters, as gasoline and diesel  
fuel oxygenate additives, prepared from biomass by hydrolysis and

esterification with olefins  
 IN Fagan, Paul Joseph; Korovessi, Ekaterini; Manzer, Leo E.; Mehta, Rakesh;  
 Thomas, Stuart M.  
 PA E. I. Du Pont de Nemours & Co., USA  
 SO PCT Int. Appl., 28 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003085071	A1	20031016	WO 2003-US9853	20030401
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			US 2002-369380P	P 20020401
CA	2479531	AA	20031016	CA 2003-2479531	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
AU	2003224812	A1	20031020	AU 2003-224812	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
US	2003233011	A1	20031218	US 2003-404322	20030401
				US 2002-369380P	P 20020401
EP	1490457	A1	20041229	EP 2003-721503	20030401
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK			US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
US	2005118691	A1	20050602	US 2003-507062	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
CN	1643116	A	20050720	CN 2003-807436	20030401
				US 2002-369380P	P 20020401
JP	2005521748	T2	20050721	JP 2003-582252	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401

OS MARPAT 139:294305  
 AB Levulinic acid esters and formate esters are prepared from biomass by aqueous acid hydrolysis of biomass, to form a first reaction mixture (containing levulinic acid, formic acid, and furfural) and a solid phase, which is separated After removal of furfural from the solid-free liquid phase. the liquid phase is reacted with an olefin in the presence of a second acid catalyst, to produce an organic phase containing levulinate esters and formate esters, which are separated from the other components. Furfural is preferably separated by liquid-liquid solvent extraction Both acid catalysts (i.e., the initial hydrolysis catalyst and the esterification catalyst) are soluble acids with pKa of <4 or a heterogeneous solid acid with H0 ≤2. The levulinate and formate esters are useful as gasoline antiknock additives, diesel fuel additives (e.g., cetane number improvers), and additives for biofuels, especially biodiesel and biodiesel-conventional diesel fuel blends.  
 RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 3 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinate esters from biomass wastes  
AN 2001:412995 CAPLUS  
DN 135:138980  
TI Levulinate esters from biomass wastes  
AU Olson, Edwin S.; Kjeldsen, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.  
CS The Energy and Environmental Research Center, University of North Dakota,  
Grand Forks, ND, 58202-9018, USA  
SO ACS Symposium Series (2001), 784(Chemicals and Materials from Renewable  
Resources), 51-63  
CODEN: ACSMC8; ISSN: 0097-6156  
PB American Chemical Society  
DT Journal  
LA English  
AB The conversion of resin-bonded furniture and building waste to  
levulinate esters was studied with a view to producing  
fuels, solvents, and chemical intermediates and other useful  
byproducts in an inexpensive process. The acid-catalyzed reaction of  
cellulosic materials with ethanol or methanol at 200° gives good  
yields of levulinate and formate esters. A solid  
residue (charcoal) and a resinous lignin residue are also obtained. The  
excess alc. solvent is recycled. An advantage of the reaction in alc. is  
that wastewater is minimized and products are purified easily by distillation

of  
the esters. Methanol and ethanol, which give the highest yields of  
levulinate esters, can be obtained at a low production cost. These  
esters are therefore the preferred intermediates for conversion to many  
other products. The Et ester was converted in high yield to a number of  
other esters by Fischer esterification. The resulting ketoesters are  
substrates for a variety of condensation and addition reactions at the ester  
and keto groups. A market for these higher-value products is needed to  
justify the process cost.

RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 4 OF 4 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinate ester intermediates from biomass.  
AN 1999:539847 CAPLUS  
TI Levulinate ester intermediates from biomass.  
AU Olson, Edwin S.; Kjeldsen, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.  
CS Energy & Environmental Research Center, University of North Dakota, Grand  
Forks, ND, 58202-9018, USA  
SO Book of Abstracts, 218th ACS National Meeting, New Orleans, Aug. 22-26  
(1999), CELL-013 Publisher: American Chemical Society, Washington, D. C.  
CODEN: 67ZJA5  
DT Conference; Meeting Abstract  
LA English  
AB The direct conversion of waste biomass to levulinate esters has  
been further investigated with the view to producing fuels,  
solvents, and chemical intermediates as well as other useful byproducts in an  
inexpensive process. The acid-catalyzed reaction of cellulosic materials  
with ethanol or methanol at 200C gives good yields of levulinate  
and formate esters. A solid residue (charcoal) and a resinous  
lignin residue are also obtained. The excess alc. solvent is recycled.  
An advantage of the reaction in alc. is that wastewater is minimized and  
products are purified easily by distillation of the esters. Methanol and  
ethanol give the highest yields of levulinate esters and can be  
obtained at low cost of production. These esters are, therefore, preferred  
intermediates for conversion to many other products. The Et ester has  
been converted in high yield to a number of other esters by Fischer  
esterification. The resulting ketoesters are substrates for a variety of  
condensation and addition reactions at the ester and keto groups.

=> logoff hold

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	26.80	27.01
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-3.00	-3.00

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FULL ESTIMATED COST	26.80	27.01
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-3.00	-3.00

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FILE 'CAPLUS' ENTERED AT 06:45:16 ON 21 JUN 2006

L1	1239 LEVULINATE
L2	41682 FORMATE
L3	47 L1 AND L2
L4	70183 GASOLINE
L5	4 FULS
L6	429770 FUEL
L7	379639 ?FUEL
L8	430585 L6 OR L7
L9	477388 L4 OR L8
L10	4 L3 AND L9

=> Levulin?

L11 4975 LEVULIN?

=> form?

SYSTEM LIMITS EXCEEDED - SEARCH ENDED

The search profile you entered was too complex or gave too many answers. Simplify or subdivide the query and try again. If you have exceeded the answer limit, enter DELETE HISTORY at an arrow prompt (>) to remove all previous answers sets and begin at L1. Use the SAVE command to store any important profiles or answer sets before using DELETE HISTORY.

=> formic or formate

46690 FORMIC  
 40402 FORMATE

3436 FORMATES  
41682 FORMATE  
(FORMATE OR FORMATES)  
L12 79846 FORMIC OR FORMATE

=> l11(1)l12  
L13 178 L11(L)L12

=> 19 an l13  
MISSING OPERATOR L9 AN  
The search profile that was entered contains terms or nested terms that are not separated by a logical operator.

=>  
=> 19 and l13  
L14 8 L9 AND L13

=> d l14 1-8 ti

L14 ANSWER 1 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI The biofine technology: a "bio-refinery" concept based on thermochemical conversion of cellulosic biomass

L14 ANSWER 2 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid esters and formate esters as gasoline and diesel fuel additives prepared from  $\alpha$ -angelica lactone

L14 ANSWER 3 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from biomass

L14 ANSWER 4 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI The Biofine process: A biorefinery concept based on thermochemical conversion of biomass

L14 ANSWER 5 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic and formic acid esters, as gasoline and diesel fuel oxygenate additives, prepared from biomass by hydrolysis and esterification with olefins

L14 ANSWER 6 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinate esters from biomass wastes

L14 ANSWER 7 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Effect of organic acids on the growth and fermentation of ethanologenic Escherichia coli LY01

L14 ANSWER 8 OF 8 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinate ester intermediates from biomass.

=> alkene or olefin  
34514 ALKENE  
82388 ALKENES  
94660 ALKENE  
(ALKENE OR ALKENES)  
98346 OLEFIN  
101280 OLEFINS  
153830 OLEFIN  
(OLEFIN OR OLEFINS)  
L15 207935 ALKENE OR OLEFIN

=> l14 and l15  
L16 2 L14 AND L15

=> d 116 1-2 ti fbib abs

L16 ANSWER 1 OF 2 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid esters and formate esters as  
gasoline and diesel fuel additives prepared from  
 $\alpha$ -angelica lactone

AN 2005:698416 CAPLUS

DN 143:196535

TI Levulinic acid esters and formate esters as  
gasoline and diesel fuel additives prepared from  
 $\alpha$ -angelica lactone

IN Manzer, Leo Ernest

PA USA

SO U.S. Pat. Appl. Publ., 16 pp.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005171374	A1	20050804	US 2004-768276	20040130
	WO 2005075405	A1	20050818	WO 2005-US2744	20050128
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			US 2004-768276	A 20040130

OS MARPAT 143:196535

AB Fuels and fuel additives are levulinic acid  
esters prepared by reaction of  $\alpha$ -angelica lactone (i.e.,  
5-methyl-2(3H)-furanone) with olefins of general formula  
R1R2C=CR3R4, in the presence of an aqueous acid catalyst, to form esters with  
general structures CH3-C(:O)-(CH2)2-C(:O)-O-CR1R2-CHR3R4 or  
CH3-C(:O)-(CH2)2-C(:O)-O-CR3R4.2-CHR1R2 (R1,R2,R3,R4 are H,  
C1-10-substituted or -unsubstituted alkyl, C3-20-cycloalkyl (in which  
 $\geq 2$  can form a cyclic or bicyclic alkyl), such that the total number of  
carbon atoms is  $\leq 22$ ). In addition, formic acid may be added  
to the  $\alpha$ -angelica lactone-containing reaction mixture to form  
formate esters of general structures HC(:O)-O-CR1R2-CHR3R4 and  
HC(:O)-O-CR3R4-CHR1R2, in which R1, R2, R3, and R4 are as described above.  
 $\alpha$ -Angelica lactone is typically prepared by aqueous acid hydrolysis of  
biomass at 0.69-13.8 MPa and 200-250°.

L16 ANSWER 2 OF 2 CAPLUS COPYRIGHT 2006 ACS on STN

TI Levulinic and formic acid esters, as gasoline  
and diesel fuel oxygenate additives, prepared from biomass by  
hydrolysis and esterification with olefins

AN 2003:818512 CAPLUS

DN 139:294305

TI Levulinic and formic acid esters, as gasoline  
and diesel fuel oxygenate additives, prepared from biomass by  
hydrolysis and esterification with olefins

IN Fagan, Paul Joseph; Korovessi, Ekaterini; Manzer, Leo E.; Mehta, Rakesh;  
Thomas, Stuart M.

PA E. I. Du Pont de Nemours & Co., USA

SO PCT Int. Appl., 28 pp.

CODEN: PIXXD2

DT Patent  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003085071	A1	20031016	WO 2003-US9853	20030401
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			US 2002-369380P	P 20020401
	CA 2479531	AA	20031016	CA 2003-2479531	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
	AU 2003224812	A1	20031020	AU 2003-224812	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
	US 2003233011	A1	20031218	US 2003-404322	20030401
				US 2002-369380P	P 20020401
	EP 1490457	A1	20041229	EP 2003-721503	20030401
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK			US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
	US 2005118691	A1	20050602	US 2003-507062	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401
	CN 1643116	A	20050720	CN 2003-807436	20030401
				US 2002-369380P	P 20020401
	JP 2005521748	T2	20050721	JP 2003-582252	20030401
				US 2002-369380P	P 20020401
				WO 2003-US9853	W 20030401

OS MARPAT 139:294305

AB Levulinic acid esters and formate esters are prepared from biomass by aqueous acid hydrolysis of biomass, to form a first reaction mixture (containing levulinic acid, formic acid, and furfural) and a solid phase, which is separated. After removal of furfural from the solid-free liquid phase, the liquid phase is reacted with an olefin in the presence of a second acid catalyst, to produce an organic phase containing levulinate esters and formate esters, which are separated from the other components. Furfural is preferably separated by liquid-liquid solvent extraction. Both acid catalysts (i.e., the initial

hydrolysis catalyst and the esterification catalyst) are soluble acids with pKa of <4 or a heterogeneous solid acid with H0 ≤ 2. The levulinate and formate esters are useful as gasoline antiknock additives, diesel fuel additives (e.g., cetane number improvers), and additives for biofuels, especially biodiesel and biodiesel-conventional diesel fuel blends.

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> l14 not l16  
L17 6 L14 NOT L16

=> d l17 1-6 ti fbib abs

L17 ANSWER 1 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN  
TI The biofine technology: a "bio-refinery" concept based on thermochemical conversion of cellulosic biomass  
AN 2006:163347 CAPLUS  
TI The biofine technology: a "bio-refinery" concept based on thermochemical conversion of cellulosic biomass  
AU Fitzpatrick, Stephen W.  
CS Biofine Technologies LLC, Waltham, MA, 02451, USA  
SO ACS Symposium Series (2006), 921(Feedstocks for the Future), 271-287  
CODEN: ACSMC8; ISSN: 0097-6156  
PB American Chemical Society  
DT Journal  
LA English  
AB The Biofine process is a high temperature, dilute acid-catalyzed rapid hydrolysis of lignocellulosic biomass. The process refines the biomass feed into four products: Levulinic acid, a versatile platform chemical, formic acid and furfural, commodity chems. and a carbonaceous powder that can be burned or gasified to produce steam and elec. power. The process is carried out in a reactor system that enhances the yield of the major products making it com. viable. The process is flexible enough to utilize a wide range of lignocellulose. Derivative products of interest include automotive fuels, monomers, herbicides and general chems. A com. scale process is now under construction. The process could potentially allow biomass to displace crude oil as the primary source of fuels and chems.

RE.CNT 49 THERE ARE 49 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 2 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from biomass  
AN 2004:667745 CAPLUS  
DN 142:200444  
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from biomass  
AU Fugalli, Serena  
CS Le Calorie Srl, Caserta, Italy  
SO Chimica e l'Industria (Milan, Italy) (2004), 86(2), 56-59  
CODEN: CINMAB; ISSN: 0009-4315  
PB Editrice Bias Sas  
DT Journal  
LA Italian  
AB An innovative technol. process to transform cellulosic wastes, from, e.g., plant residues, papermaking sludges, sawdust and wood shop cuttings, etc., into levulinic acid (LA) was developed at Le Calorie, Caserta, Italy. The process is based on acid hydrolysis using heat, water, and a diluted mineral acid to convert cellulose from various sources into LA. LA is of interest as feedstock for production of several high value derivs., especially esters for use as, e.g., solvents, chems., bio-herbicides; bio-pesticides, fuel additives, specialty monomers, resins, and plastics.

L17 ANSWER 3 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN  
TI The Biofine process: A biorefinery concept based on thermochemical conversion of biomass  
AN 2004:222219 CAPLUS  
TI The Biofine process: A biorefinery concept based on thermochemical conversion of biomass  
AU Fitzpatrick, Stephen W.  
CS Biofine Inc, Waltham, MA, 02451, USA  
SO Abstracts of Papers, 227th ACS National Meeting, Anaheim, CA, United States, March 28-April 1, 2004 (2004), CELL-173 Publisher: American Chemical Society, Washington, D. C.  
CODEN: 69FGKM

DT Conference; Meeting Abstract  
LA English  
AB Biofine has developed a fast thermochem. process for conversion of lignocellulosic biomass into useful platform chems. The primary fractions are: levulinic acid, (a highly versatile five carbon keto acid), formic acid, furfural (from the hemicellulosic fraction) and a carbonaceous char suitable for conversion to synthesis gas. Levulinic acid, produced in high yield in the process, can be converted into a wide range of environmentally acceptable chems. products including gasoline and diesel oxygenates, biodegradable polymers, environmentally benign pesticides, and solvents. The process can use feedstock from a wide range of sources including: paper sludge, waste paper, agricultural residues, municipal solid waste and wood waste. The use of cellulosic resources to produce chems. and fuels represents a zero or near-zero carbon dioxide production cycle since carbon dioxide is recycled within the biosphere. Economic anal. of the process suggests that the primary fractions can be produced in a price range competitive with other platform chems. presently used in the chemical industry but derived from fossil or petroleum sources.

L17 ANSWER 4 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinate esters from biomass wastes  
AN 2001:412995 CAPLUS  
DN 135:138980  
TI Levulinate esters from biomass wastes  
AU Olson, Edwin S.; Kjeldsen, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.  
CS The Energy and Environmental Research Center, University of North Dakota,  
Grand Forks, ND, 58202-9018, USA  
SO ACS Symposium Series (2001), 784(Chemicals and Materials from Renewable  
Resources), 51-63  
CODEN: ACSMC8; ISSN: 0097-6156  
PB American Chemical Society  
DT Journal  
LA English  
AB The conversion of resin-bonded furniture and building waste to levulinate esters was studied with a view to producing fuels, solvents, and chemical intermediates and other useful byproducts in an inexpensive process. The acid-catalyzed reaction of cellulosic materials with ethanol or methanol at 200° gives good yields of levulinate and formate esters. A solid residue (charcoal) and a resinous lignin residue are also obtained. The excess alc. solvent is recycled. An advantage of the reaction in alc. is that wastewater is minimized and products are purified easily by distillation  
of the esters. Methanol and ethanol, which give the highest yields of levulinate esters, can be obtained at a low production cost. These esters are therefore the preferred intermediates for conversion to many other products. The Et ester was converted in high yield to a number of other esters by Fischer esterification. The resulting ketoesters are substrates for a variety of condensation and addition reactions at the ester and keto groups. A market for these higher-value products is needed to justify the process cost.  
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 5 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Effect of organic acids on the growth and fermentation of ethanogenic Escherichia coli LY01  
AN 1999:812596 CAPLUS  
DN 132:150647  
TI Effect of organic acids on the growth and fermentation of ethanogenic Escherichia coli LY01  
AU Zaldivar, Jesus; Ingram, Lonnie O.  
CS Inst. Food Agric. Sci., Univ. Florida, Gainesville, FL, 32611, USA  
SO Biotechnology and Bioengineering (1999), 66(4), 203-210

CODEN: BIBIAU; ISSN: 0006-3592  
PB John Wiley & Sons, Inc.  
DT Journal  
LA English  
AB Hemicellulose residues can be hydrolyzed into a sugar syrup using dilute mineral acids. Although this syrup represents a potential feedstock for biofuel production, toxic compds. generated during hydrolysis limit microbial metabolism. *E. coli* LY01, an ethanologenic biocatalyst engineered to ferment the mixed sugars in hemicellulose syrups, has been tested for resistance to selected organic acids that are present in hemicellulose hydrolyzates. Compds. tested include aromatic acids derived from lignin (ferulic, gallic, 4-hydroxybenzoic, syringic, and vanillic acids), acetic acid from the hydrolysis of acetylxyylan, and others derived from sugar destruction (furoic, formic, levulinic, and caproic acids). Toxicity was related to hydrophobicity. Combinations of acids were roughly additive as inhibitors of cell growth. When tested at concns. that inhibited growth by 80%, none appeared to strongly inhibit glycolysis and energy generation or to disrupt membrane integrity. Toxicity was not markedly affected by inoculum size or incubation temperature. The toxicity of all acids except gallic acid was reduced by an increase in initial pH (from pH 6.0 to pH 7.0 to pH 8.0). Together, these results are consistent with the hypothesis that both aliphatic and mononuclear organic acids inhibit growth and ethanol production in LY01 by collapsing ion gradients and increasing internal anion concns.

RE.CNT 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 6 OF 6 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinate ester intermediates from biomass.  
AN 1999:539847 CAPLUS  
TI Levulinate ester intermediates from biomass.  
AU Olson, Edwin S.; Kjeldsen, Michelle R.; Schlag, Adam J.; Sharma, Ramesh K.  
CS Energy & Environmental Research Center, University of North Dakota, Grand Forks, ND, 58202-9018, USA  
SO Book of Abstracts, 218th ACS National Meeting, New Orleans, Aug. 22-26 (1999), CELL-013 Publisher: American Chemical Society, Washington, D. C.  
CODEN: 67ZJA5  
DT Conference; Meeting Abstract  
LA English  
AB The direct conversion of waste biomass to levulinate esters has been further investigated with the view to producing fuels, solvents, and chemical intermediates as well as other useful byproducts in an inexpensive process. The acid-catalyzed reaction of cellulosic materials with ethanol or methanol at 200C gives good yields of levulinate and formate esters. A solid residue (charcoal) and a resinous lignin residue are also obtained. The excess alc. solvent is recycled. An advantage of the reaction in alc. is that wastewater is minimized and products are purified easily by distillation of the esters. Methanol and ethanol give the highest yields of levulinate esters and can be obtained at low cost of production. These esters are, therefore, preferred intermediates for conversion to many other products. The Et ester has been converted in high yield to a number of other esters by Fischer esterification. The resulting ketoesters are substrates for a variety of condensation and addition reactions at the ester and keto groups.

=> d his

(FILE 'HOME' ENTERED AT 06:45:04 ON 21 JUN 2006)

FILE 'CAPLUS' ENTERED AT 06:45:16 ON 21 JUN 2006  
L1 1239 LEVULINATE  
L2 41682 FORMATE  
L3 47 L1 AND L2

L4 70183 GASOLINE  
 L5 4 FULS  
 L6 429770 FUEL  
 L7 379639 ?FUEL  
 L8 430585 L6 OR L7  
 L9 477388 L4 OR L8  
 L10 4 L3 AND L9  
 L11 4975 LEVULIN?  
 L12 79846 FORMIC OR FORMATE  
 L13 178 L11(L)L12  
 L14 8 L9 AND L13  
 L15 207935 ALKENE OR OLEFIN  
 L16 2 L14 AND L15  
 L17 6 L14 NOT L16

=> levulinic  
 L18 3959 LEVULINIC

=> l18(1)l15  
 L19 7 L18(L)L15

=> d l19 1-7 ti

L19 ANSWER 1 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Levulinic acid esters and formate esters as gasoline and diesel fuel additives prepared from  $\alpha$ -angelica lactone

L19 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Levulinic and formic acid esters, as gasoline and diesel fuel oxygenate additives, prepared from biomass by hydrolysis and esterification with olefins

L19 ANSWER 3 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Catalytic Enantioselective [3 + 2]-Cycloadditions of Diazoketone-Derived Aryl-Substituted Carbonyl Ylides

L19 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Addition of nitrosyl chloride to olefins. Synthesis of some chloro ketones

L19 ANSWER 5 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Stabilized olefin polymers

L19 ANSWER 6 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Amino sulfonic and amino carboxylic acids

L19 ANSWER 7 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Long chain alkoxy alkanol esters

=> d l19 7 ti fbib abs

L19 ANSWER 7 OF 7 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Long chain alkoxy alkanol esters  
 AN 1938:39762 CAPLUS  
 DN 32:39762  
 OREF 32:5534e-i,5535a  
 TI Long chain alkoxy alkanol esters  
 IN Graves, Geo. D.  
 PA E. I. Du Pont de Nemours & Co.  
 DT Patent  
 LA Unavailable  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI US 2118506                    19380524     US 1934-754309     19341122  
 AB Esters suitable for use as plasticizers with cellulose esters and ethers and with natural or synthetic resins are prepared by usual esterification methods, details being given of the production of the laurate of the monododecyl ether of ethylene glycol, a waxy product, the acetate of the monododecyl ether of ethylene glycol, the stearate of the monododecyl ether of diethylene glycol, a wax-like product m. 24°, the adipate of the monododecyl ether of ethylene glycol and the monododecyl ether of diethylene glycol, the phthalate of mixed monoalkyl ethers of ethylene glycol (a light colored oil), the oleate of the monododecyl ethers of ethylene glycol and diethylene glycol, and the levulinate of the monododecyl ether of ethylene glycol, and general mention is made of the similar production of esters from dihydric alcs. containing 2-22 C atoms, which can be prepared by carboxyl hydrogenation of the corresponding hydroxy acids, or by the addition of a mol. of water to the corresponding unsatd. monohydric alcs. They may also be produced by peracetylation of olefins. Many of these polyhydric alcs. may be treated with a long-chain alc. to form a monoether which is subsequently treated with the acids to prepare the esters. The alcs. which may be employed to form the monoalkyl ethers of dihydric alcs. embrace alcs. from vegetable oils by hydrogenation, e. g., the alcs. present in carboxyl hydrogenated coconut oil, the alcs. obtained from animal oils, such as sperm oil by carboxyl hydrogenation, naphthenyl alcs. by carboxyl hydrogenation of naphthenic acid, eleostearyl alc. by Na reduction of China-wood oil, linoleyl alc. by Na reduction of linseed oil, ricinoleyl alc. by Na reduction of castor oil, abietyl alc. by Na reduction of abietic acid, or the higher alcs. obtained in the methanol synthesis. Various acids are mentioned as suitable for use in the esterifications, including acetic, propionic, butyric, isobutyric, higher branched chain acids corresponding to the higher alcs. obtained in the MeOH synthesis, caprylic, lauric, levulinic, glycolic, lactic, methoxyacetic, oleic, succinic, adipic, maleic, benzoic, phthalic, benzoylbenzoic, chlorobenzoylbenzoic, naphthenic, hexahydrobenzoic, octahydrocinnamic, cyclohexylacetic and abietic acids (the methyl esters or acid chlorides of the acids also being suitable for the esterifications).

=> logoff hold			
COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION	
FULL ESTIMATED COST	86.05	86.26	
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CA SUBSCRIBER PRICE	-9.75	-9.75	

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PASSWORD:

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DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-9.75	-9.75
=> file reg		
COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	86.51	86.72
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-9.75	-9.75

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 DICTIONARY FILE UPDATES: 20 JUN 2006 HIGHEST RN 888507-19-5

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 \*  
 \* The CA roles and document type information have been removed from \*  
 \* the IDE default display format and the ED field has been added, \*  
 \* effective March 20, 2005. A new display format, IDERL, is now \*  
 \* available and contains the CA role and document type information. \*  
 \*  
 \*\*\*\*

Structure search iteration limits have been increased. See HELP SLIMITS for details.

REGISTRY includes numerically searchable data for experimental and predicted properties as well as tags indicating availability of experimental property data in the original document. For information on property searching in REGISTRY, refer to:

<http://www.cas.org/ONLINE/UG/regprops.html>

```
=> e levulinic acid/cn
E1          1      LEVULINANILIDE, SEMICARBAZONE/CN
E2          1      LEVULINATE ION/CN
E3          1  --> LEVULINIC ACID/CN
E4          1      LEVULINIC ACID 1-PHENYLPIPERAZINE SALT/CN
E5          1      LEVULINIC ACID AMIDE/CN
E6          1      LEVULINIC ACID ANHYDRIDE/CN
E7          1      LEVULINIC ACID CHLORIDE/CN
E8          1      LEVULINIC ACID DIMETHYLAMIDE/CN
E9          1      LEVULINIC ACID ETHYL ESTER SEMICARBAZONE/CN
E10         1      LEVULINIC ACID HYDRAZONE/CN
E11         1      LEVULINIC ACID NITRILE/CN
```

E12 1 LEVULINIC ACID OXIME/CN

=> e3

L20 1 "LEVULINIC ACID"/CN

=> d 120

L20 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2006 ACS on STN

RN 123-76-2 REGISTRY

ED Entered STN: 16 Nov 1984

CN Pentanoic acid, 4-oxo- (9CI) (CA INDEX NAME)

OTHER CA INDEX NAMES:

CN Levulinic acid (8CI)

OTHER NAMES:

CN  $\beta$ -Acetylpropionic acid

CN  $\gamma$ -Ketovaleric acid

CN 3-Acetylpropionic acid

CN 4-Ketovaleric acid

CN 4-Oxopentanoic acid

CN 4-Oxovaleric acid

CN Laevulinic acid

CN Levulic acid

CN NSC 3716

FS 3D CONCORD

MF C5 H8 O3

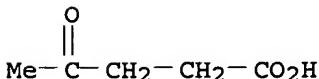
CI COM

LC STN Files: AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN\*, BIOSIS, BIOTECHNO, CA, CABA, CAOLD, CAPLUS, CASREACT, CBNB, CHEMCATS, CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, DDFU, DETHERM\*, DRUGU, EMBASE, GMELIN\*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK\*, MSDS-OHS, NAPRALERT, PIRA, PROMT, PS, RTECS\*, SPECINFO, SYNTHLINE, TOXCENTER, TULSA, USAN, USPAT2, USPATFULL, VTB

(\*File contains numerically searchable property data)

Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*

(\*\*Enter CHEMLIST File for up-to-date regulatory information)



\*\*PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT\*\*

2375 REFERENCES IN FILE CA (1907 TO DATE)

92 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

2382 REFERENCES IN FILE CAPLUS (1907 TO DATE)

3 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

=> file caplus

COST IN U.S. DOLLARS

SINCE FILE  
ENTRY

TOTAL  
SESSION

FULL ESTIMATED COST

7.10

93.82

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)

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ENTRY

TOTAL  
SESSION

CA SUBSCRIBER PRICE

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FILE LAST UPDATED: 20 Jun 2006 (20060620/ED)

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<http://www.cas.org/infopolicy.html>

```
=> l20/prep
      2382 L20
      3485484 PREP/RL
L21      298 L20/PREP
          (L20 (L) PREP/RL)

=> biomass
      67966 BIOMASS
      844 BIOMASSES
L22      68252 BIOMASS
          (BIOMASS OR BIOMASSES)

=> l21 and l22
L23      26 L21 AND L22

=> d 123 16-26 ti

L23 ANSWER 16 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Some present research trends in the field of chemical processing of wood
biomass and brown coals

L23 ANSWER 17 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI A new approach for the production of 2,5-furandicarboxylic acid by in situ
oxidation of 5-hydroxymethylfurfural starting from fructose

L23 ANSWER 18 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Method for the production of levulinic acid and its derivatives

L23 ANSWER 19 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Production of levulinic acid and use as a platform chemical for derived
products

L23 ANSWER 20 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Hydrolytic method for the production of levulinic acid and its derivatives
from biomass and sugars

L23 ANSWER 21 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Chemical use of biomass. Part II. Kinetics of acid hydrolysis of
cellulose

L23 ANSWER 22 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
TI Cryo-hydrolysis of plant biomass

L23 ANSWER 23 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN
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TI Chemical processing of biomass. II. Production of levulinic acid by acidic hydrolysis of plant materials

L23 ANSWER 24 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN

TI Biomass derived levulinic acid derivatives and their use as liquid fuel extenders

L23 ANSWER 25 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN

TI Photoinduced electron transfer cleavage of lignocellulosics

L23 ANSWER 26 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN

TI Chemical comparisons of liquid fuel produced by thermochemical liquefaction of various biomass materials

=> d 123 18, 19,20,23,24, 26 ti fbbib abs

L23 ANSWER 18 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN

TI Method for the production of levulinic acid and its derivatives  
AN 2000:271956 CAPLUS

DN 132:280727

TI Method for the production of levulinic acid and its derivatives

IN Farone, William A.; Cuzens, John E.

PA Arkenol, Inc., USA

SO U.S., 13 pp., Cont.-in-part of U.S. 5,892,107.

CODEN: USXXAM

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6054611	A	20000425	US 1998-76941	19980513
				US 1996-747441	A2 19961108
	US 5892107	A	19990406	US 1996-747441	19961108
	ZA 9710038	A	19980701	ZA 1997-10038	19971107
				US 1996-747441	A 19961108

PATENT FAMILY INFORMATION:

FAN 1998:323227

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9819986	A1	19980514	WO 1997-US20127	19971104
	W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG				
				US 1996-747441	A 19961108
	US 5892107	A	19990406	US 1996-747441	19961108
	AU 9851678	A1	19980529	AU 1998-51678	19971104
				US 1996-747441	A 19961108
				WO 1997-US20127	W 19971104
	EP 937024	A1	19990825	EP 1997-946522	19971104
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
				US 1996-747441	A 19961108
				WO 1997-US20127	W 19971104
	ZA 9710038	A	19980701	ZA 1997-10038	19971107
				US 1996-747441	A 19961108

AB A method of producing dehydration products from one more 5-carbon or 6-carbon sugars includes reacting said one or more sugars at 40-240° for 1 to 96 h in the presence of 5-90% sulfuric acid, separating the reaction products, and recovering levulinic acid. The sugars are can

be generated from strong acid hydrolysis of biomass, such as rice straw, paper, cotton and other cellulosic materials.

RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 19 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Production of levulinic acid and use as a platform chemical for derived products  
AN 1999:713367 CAPLUS  
DN 132:38007  
TI Production of levulinic acid and use as a platform chemical for derived products  
AU Elliott, D. C.; Fitzpatrick, S. W.; Bozell, J. J.; Jarnefeld, J. L.; Bilski, R. J.; Moens, L.; Frye, J. G., Jr.; Wang, Y.; Neuenschwander, G.  
CS Pacific Northwest National Laboratory, Richland, WA, 99352, USA  
SO Biomass: A Growth Opportunity in Green Energy and Value-Added Products, Proceedings of the Biomass Conference of the Americas, 4th, Oakland, Calif., Aug. 29-Sept. 2, 1999 (1999), Volume 1, 595-600. Editor(s): Overend, Ralph P.; Chornet, Esteban. Publisher: Elsevier Science, Oxford, UK.  
CODEN: 68IQAG  
DT Conference  
LA English  
AB Levulinic acid (LA) can be produced cost effectively and in high yields from renewable cellulosics. The technol. to convert cellulosic biomass to LA is being demonstrated on a 1 ton/day scale using paper mill sludge and municipal solid waste as the feedstock. Low cost LA has great possibilities as a platform chemical for the production of a wide range of value-added product chems. For example, a process developed at Pacific Northwest National Laboratory produces methyltetrahydrofuran (MTHF) from LA in > 80% molar yield by a single-stage catalytic hydrogenation process. MTHF may be used as a solvent and as a fuel. In other work, the National Renewable Energy Laboratory has developed a new preparation of δ-aminolevulinic acid (DALA), a broad spectrum herbicide, from LA. Each reaction step proceeds in high (> 80%) yield and affords DALA in greater than 90% purity, giving a process that could be com. viable. LA is also being investigated at Rensselaer Polytechnic Institute as a starting material for the production of diphenolic acid, a direct replacement for bisphenol A in several com. polymers.  
RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 20 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Hydrolytic method for the production of levulinic acid and its derivatives from biomass and sugars  
AN 1998:323227 CAPLUS  
DN 128:323154  
TI Hydrolytic method for the production of levulinic acid and its derivatives from biomass and sugars  
IN Farone, William A.; Cuzens, John E.  
PA Arkenol, Inc., USA  
SO PCT Int. Appl., 26 pp.  
CODEN: PIXXD2  
DT Patent  
LA English  
FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	-----	-----	-----	-----
PI WO 9819986	A1	19980514	WO 1997-US20127	19971104
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ,				

LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG			
US 5892107	A 19990406	US 1996-747441	A 19961108
AU 9851678	A1 19980529	AU 1998-51678	19971104
		US 1996-747441	A 19961108
		WO 1997-US20127	W 19971104
EP 937024	A1 19990825	EP 1997-946522	19971104
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI		US 1996-747441	A 19961108
		WO 1997-US20127	W 19971104
ZA 9710038	A 19980701	ZA 1997-10038	19971107
		US 1996-747441	A 19961108

PATENT FAMILY INFORMATION:

FAN 2000:271956

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6054611	A	20000425	US 1998-76941	19980513
				US 1996-747441	A2 19961108
	US 5892107	A	19990406	US 1996-747441	19961108
	ZA 9710038	A	19980701	ZA 1997-10038	19971107
				US 1996-747441	A 19961108

AB Levulinic acid and its derivs. (e.g., fumaric acid, maleic acid, etc.) are prepared in high yield and selectivity by mixing biomass (e.g., cotton, straw, etc.) containing cellulose and hemicellulose with a solution of 25-90% acid (e.g., H<sub>2</sub>SO<sub>4</sub>) to form a liquid-solid gel, diluting the formed gel to an acid concentration of 20-30%, heating the mixture to 80-100°, separating the liquid portion from the solid portion to produce a 1st liquid containing a sugar-acid mixture, mixing the separated solid portion with 25-90% acid to an acid concentration of 20-30%, heating the solid mixture to 80-100° to promote further cellulose and hemicellulose hydrolysis, separating a 2nd liquid portion containing a sugar-acid mixture, combining the 1st and 2nd liquid potions,  
heating the combined liqs. to 40-240° for 1-96 h, separating the reaction products, and recovering the levulinic acid. Process flow diagrams are presented.

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L23 ANSWER 23 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Chemical processing of biomass. II. Production of levulinic acid by acidic hydrolysis of plant materials  
 AN 1990:200905 CAPLUS  
 DN 112:200905  
 TI Chemical processing of biomass. II. Production of levulinic acid by acidic hydrolysis of plant materials  
 AU Szokonya, L.; Kovacs, M.; Marton, G.; Havas-Dencs, J.  
 CS Dep. Chem. Process Eng., Veszprem Univ. Chem. Eng., Veszprem, Hung.  
 SO Hungarian Journal of Industrial Chemistry (1989), 17(4), 477-90  
 CODEN: HJICAI; ISSN: 0133-0276  
 DT Journal  
 LA English  
 AB The desired main product of acid hydrolysis of the cellulose parts of plant materials can be varied by the appropriate selection of the operation parameters. In the case of industrial-scale cellulose hydrolysis, the diffusion rates of the products formed should be taken into consideration. A math model was developed in order to describe cellulose hydrolysis accompanied by diffusion. The parameters of the solution functions of the math. model were identified by the Nelder-Mead optimization method by using exptl. kinetic curves.

L23 ANSWER 24 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Biomass derived levulinic acid derivatives and their use as liquid fuel extenders  
AN 1986:517735 CAPLUS  
DN 105:117735  
TI Biomass derived levulinic acid derivatives and their use as liquid fuel extenders  
AU Thomas, John J.; Barile, Ronald G.  
CS Med. Res. Inst., Florida Inst. Technol., Melbourne, FL, 32901, USA  
SO Biomass Energy Dev., [Proc. South. Biomass Energy Res. Conf.], 3rd (1986), Meeting Date 1985, 333-48. Editor(s): Smith, Wayne H. Publisher: Plenum, New York, N. Y.  
CODEN: 55DMAF  
DT Conference  
LA English  
AB In the manufacture of levulinic acid derivs. (I) by hydrolysis of cellulose-containing biomass, optimum yields are attained when newspapers are used as the feedstock; computer paper and sawdust give lower yields. H<sub>2</sub>SO<sub>4</sub> assures higher yields than HCl. Reaction time >3 h are required. I are of interest as a gasoline extenders.

L23 ANSWER 26 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Chemical comparisons of liquid fuel produced by thermochemical liquefaction of various biomass materials  
AN 1984:9917 CAPLUS  
DN 100:9917  
TI Chemical comparisons of liquid fuel produced by thermochemical liquefaction of various biomass materials  
AU Russell, J. A.; Molton, P. M.; Landsman, S. D.  
CS Pac. Northwest Lab., Richland, WA, 99352, USA  
SO Altern. Energy Sources (1983), Volume Date 1980, 3(3), 307-22  
CODEN: ALESOK; ISSN: 0278-1662  
DT Journal  
LA English  
AB Liquefaction of biomass in aqueous alkali at ≤350° is an effective way to convert solid wastes to liquid fuels. Liquefaction oils from several forms of biomass differing in proportions of cellulose, hemicellulose, lignin, protein, and minerals were studied and their chemical compns. were compared. The proportions of chemical components varied considerably depending on the type of biomass liquefied. However, all the oils, even those produced from cellulose, had similar chemical characteristics due to the presence of significant quantities of phenols. These phenols are at least partly responsible for the corrosivity and viscosity commonly associated with biomass oils. The differences in chemical component distribution in the various biomass oils might successfully be exploited if the oil is to be used as a chemical feedstock. If the oil is to be used as a fuel, however, then reaction conditions will be a more important consideration than the source of biomass.

=> d 123 1-15 ti

L23 ANSWER 1 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Product Identification and Distribution from Hydrothermal Conversion of Walnut Shells  
L23 ANSWER 2 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Composition of Products from the Supercritical Water Gasification of Glucose: A Model Biomass Compound  
L23 ANSWER 3 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid esters and formate esters as gasoline and diesel fuel additives prepared from α-angelica lactone

- L23 ANSWER 4 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI The Biofine technology - a "bio-refinery" concept based on thermochemical conversion of cellulosic biomass to fuels and chemicals
- L23 ANSWER 5 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Review on preparation methods of levulinic acid, a new platform chemical
- L23 ANSWER 6 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI The water hyacinth as a renewable feedstock for green (bulk) chemicals
- L23 ANSWER 7 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Evaluation of the detoxification of brewery's spent grain hydrolysate for xylitol production by Debaryomyces hansenii CCM 941
- L23 ANSWER 8 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic acid. A highly versatile chemical product from papermaking sludge and from biomass
- L23 ANSWER 9 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Kinetics of glucose decomposition during dilute-acid hydrolysis of lignocellulosic biomass
- L23 ANSWER 10 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Optimization of brewery's spent grain dilute-acid hydrolysis for the production of pentose-rich culture media
- L23 ANSWER 11 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Production of glucosamine from spent fungal fermentation biomass
- L23 ANSWER 12 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Influence of the Heating Rate and the Type of Catalyst on the Formation of Key Intermediates and on the Generation of Gases During Hydropyrolysis of Glucose in Supercritical Water in a Batch Reactor
- L23 ANSWER 13 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Levulinic and formic acid esters, as gasoline and diesel fuel oxygenate additives, prepared from biomass by hydrolysis and esterification with olefins
- L23 ANSWER 14 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Experimental research on the bio-energy conversion technology
- L23 ANSWER 15 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Biomass conversion in water at 330-410°C and 30-50 MPa.  
Identification of Key Compounds for Indicating Different Chemical Reaction Pathways

=> d 123 14 ti fbib abs

- L23 ANSWER 14 OF 26 CAPLUS COPYRIGHT 2006 ACS on STN  
TI Experimental research on the bio-energy conversion technology  
AN 2003:252575 CAPLUS  
DN 139:152159  
TI Experimental research on the bio-energy conversion technology  
AU Mei, Lu; Li, Meiling; Xu, Baojiang  
CS College of Power Engineering, University of Shanghai for Science and Technology, Shanghai, 200093, Peop. Rep. China  
SO Chinese Journal of Mechanical Engineering (English Edition) (2002), 15(Suppl.), 43-47  
CODEN: CJMEER  
PB China Machine Press  
DT Journal  
LA English

AB Biomass is a potential renewable energy source. The small-scale liquefaction of biomass by flash pyrolysis was studied and new equipment was developed. The mass and energy balance of the process as well as the design of the system that includes feeding, reaction, and production collection, were completed. Bio-oil was produced and analyzed by GC-MS.

RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> dcost

0 DCOST	
L24	0 DCOST

=> d cost

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
CONNECT CHARGES	8.40	28.53
NETWORK CHARGES	1.26	4.32
SEARCH CHARGES	5.85	34.01
DISPLAY CHARGES	41.30	83.77
FULL ESTIMATED COST	56.81	150.63
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.25	-15.00

IN FILE 'CAPLUS' AT 08:11:28 ON 21 JUN 2006

=> logoff hold

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	56.81	150.63
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.25	-15.00

SESSION WILL BE HELD FOR 60 MINUTES

STN INTERNATIONAL SESSION SUSPENDED AT 08:11:35 ON 21 JUN 2006

Connecting via Winsock to STN

Welcome to STN International! Enter x:x

LOGINID:SSSPSTA1623PAZ

PASSWORD:

\* \* \* \* \* RECONNECTED TO STN INTERNATIONAL \* \* \* \* \*  
SESSION RESUMED IN FILE 'CAPLUS' AT 08:49:58 ON 21 JUN 2006  
FILE 'CAPLUS' ENTERED AT 08:49:58 ON 21 JUN 2006  
COPYRIGHT (C) 2006 AMERICAN CHEMICAL SOCIETY (ACS)

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	56.81	150.63
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.25	-15.00

=> d his

(FILE 'HOME' ENTERED AT 06:45:04 ON 21 JUN 2006)

FILE 'CPLUS' ENTERED AT 06:45:16 ON 21 JUN 2006  
L1 1239 LEVULINATE  
L2 41682 FORMATE  
L3 47 L1 AND L2  
L4 70183 GASOLINE  
L5 4 FULS  
L6 429770 FUEL  
L7 379639 ?FUEL  
L8 430585 L6 OR L7  
L9 477388 L4 OR L8  
L10 4 L3 AND L9  
L11 4975 LEVULIN?  
L12 79846 FORMIC OR FORMATE  
L13 178 L11(L)L12  
L14 8 L9 AND L13  
L15 207935 ALKENE OR OLEFIN  
L16 2 L14 AND L15  
L17 6 L14 NOT L16  
L18 3959 LEVULINIC  
L19 7 L18(L)L15

FILE 'REGISTRY' ENTERED AT 07:58:19 ON 21 JUN 2006  
E LEVULINIC ACID/CN

L20 1 E3

FILE 'CPLUS' ENTERED AT 07:58:58 ON 21 JUN 2006

L21 298 L20/PREP  
L22 68252 BIOMASS  
L23 26 L21 AND L22  
L24 0 DCOST

=> l21(1)l15

L25 1 L21(L)L15

=> d 125

L25 ANSWER 1 OF 1 CPLUS COPYRIGHT 2006 ACS on STN  
AN 2003:818512 CPLUS  
DN 139:294305  
TI Levulinic and formic acid esters, as gasoline and diesel fuel oxygenate additives, prepared from biomass by hydrolysis and esterification with olefins  
IN Fagan, Paul Joseph; Korovessi, Ekaterini; Manzer, Leo E.; Mehta, Rakesh; Thomas, Stuart M.  
PA E. I. Du Pont de Nemours & Co., USA  
SO PCT Int. Appl., 28 pp.  
CODEN: PIXXD2  
DT Patent  
LA English  
FAN.CNT 1  

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2003085071	A1	20031016	WO 2003-US9853	20030401
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,			

KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,  
 FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR,  
 BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG  
 CA 2479531 AA 20031016 CA 2003-2479531 20030401  
 AU 2003224812 A1 20031020 AU 2003-224812 20030401  
 US 2003233011 A1 20031218 US 2003-404322 20030401  
 EP 1490457 A1 20041229 EP 2003-721503 20030401  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
 IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK  
 US 2005118691 A1 20050602 US 2003-507062 20030401  
 CN 1643116 A 20050720 CN 2003-807436 20030401  
 JP 2005521748 T2 20050721 JP 2003-582252 20030401  
 PRAI US 2002-369380P P 20020401  
 WO 2003-US9853 W 20030401  
 OS MARPAT 139:294305  
 RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> 121 and 115  
 L26 6 L21 AND L15

=> 126 not 125  
 L27 5 L26 NOT L25

=> d 127 1-5 ti

L27 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Levulinic acid esters and formate esters as gasoline and diesel fuel  
 additives prepared from  $\alpha$ -angelica lactone  
  
 L27 ANSWER 2 OF 5 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Acylated nitrogen-based fouling control agents by reaction of amines with  
 acylcarboxylic acids and alkenes  
  
 L27 ANSWER 3 OF 5 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Hydroxy-substituted monolactones useful as intermediates for preparing  
 lubricating oil and fuel additives  
  
 L27 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Chromic acid oxidation of some oxiranes  
  
 L27 ANSWER 5 OF 5 CAPLUS COPYRIGHT 2006 ACS on STN  
 TI Palladium(II)-catalyzed carboxylation reactions of olefins:  
 scope and utility

=> logoff hold			
COST IN U.S. DOLLARS	SINCE FILE	TOTAL	
	ENTRY	SESSION	
FULL ESTIMATED COST	61.44	155.26	
DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE	TOTAL	
	ENTRY	SESSION	
CA SUBSCRIBER PRICE	-5.25	-15.00	

SESSION WILL BE HELD FOR 60 MINUTES  
 STN INTERNATIONAL SESSION SUSPENDED AT 08:52:38 ON 21 JUN 2006